means for storing operator set points corresponding to manual operation of furnace actuators under preselected conditions;

fuzzy logic controller means running a fuzzy logic control algorithm and connected at respective inputs to the sensors, image means, predictive network, and operator set points storing means, the controller means generating output signals for the actuators that will control melting in the furnace.

14. (Amended) The system set forth in claim 10 wherein the predictive network further comprises means for learning operating laws of the furnace, wherein the learning means is operated in accordance with a computer model of the numerical model type, making it possible to define the laws of furnace operation, selectively from a learning phase of the predictive network from actual furnace operation, or by simulation of furnace operation using a mathematical model.

REMARKS

The office action and the prior art relied upon have been carefully considered. In an effort to expedite the prosecution of the present application, claims 10 and 14 have been amended so as to avoid further rejection under 35 U.S.C § 112, ¶ 2 as relied upon by the Examiner in paragraphs 1-3 of the office action. Accordingly, further rejection on this ground is not anticipated.

Claims 10-14 and 16-18 have been rejected under the 35 U.S.C. § 103(a), as being unpatentable over AOKI in view of Victor (IEEE article). Claims 15 and 18 have been rejected under 35 U.S.C. § 103(a), as unpatentable over the combination of AOKI and Victor in further view of Miller.

Prior to reviewing the cited references in conjunction with the rejection, the Examiner's attention is drawn to the following distinctions of the claimed invention.

Reviewing claim 10, it will be noted that a number of inputs are provided for a fuzzy logic. These include sensors, images, a predictive network and stored operator set points. In the fuzzy logic controller means of claim 10, a number of inputs to these various types of input devices is provided so that the controller means can generate output signals for actuators that control melting in the furnace.

AOKI is a completely different type of system. In the first place, AOKI relies upon PID control that serves as a prior art basis upon which the present invention creates an improvement. In AOKI, the fuzzy PI controller 2 operates with a single type of input relating to the source of information which deals with variations in furnace temperature. This is the situation for both embodiments of figs. 7 and 8 of AOKI. Also see figs. 12(a) and 14(a) for plots of temperature deviation. The presently claimed invention is not restricted in this regard as is the PID controller of AOKI. Therefore it would be impossible for AOKI to handle the multiple types of inputs as set forth in Claim 10. It is to be emphasized that fig. 10 recites these **various types** of inputs as opposed to information from multiple thermocouples in different parts of the furnace as used by AOKI.

Claim 11 has been cancelled and incorporated into previous claim 14. This claim sets forth the learning means that makes it possible to define the laws of a furnace operation from a learning phase of the predictive network. In response to this limitation, the Examiner cites AOKI, column 13, lines 13-22. However, this relates to information that is "known input information" in addition to temperature inputs. Known information can hardly be likened to information that is acquired during a learning phase of a predictive network. Accordingly, claim 14 is clearly patentable over AOKI.

It is also important to bear in mind that the AOKI reference is specifically suited for controlling a process having dead time. In other words, the AOKI reference has application in long term processes. However, the present invention with its' multiple types of inputs is capable of adjusting to rapid changes in the environment of a process and this aspect sets the two systems apart.

The claims directed to the inclusion of the video camera or image processing means prompts the Examiner to rely upon the reference to Victor. However, this reference is only directed to the analysis of flames by an image treatment system. The extension of Victor to accommodate parameters relating to the appearance of a batch as it melts on the surface of a glass mount is merely indicated as an area for future exploration by Victor. See page 478, column 1, 10-15 of Victor.

In further connection with the Examiner's secondary reference to Miller in the rejection of video camera or image processing means, it is applicants position that Miller
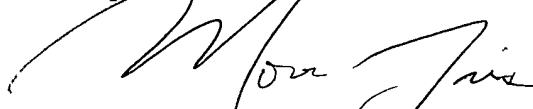
deals with only the rudimentary method of monitoring an amount of batch material and comparing it to a selected threshold to provide a reasonable estimate of the amount of batch and melt present in the viewed region of a tank (see abstract). There is no capability in Miller to further employ the video data as is used as one of several types of inputs to the fuzzy logic of the claimed invention. For the reasons set forth herein above, the claims as amended are believed to be allowable over the arts cited.

Reconsideration of the application, and favorable Action thereon, are courteously solicited.

In the event the Examiner believes an interview might serve to advance the prosecution of this application in any way, the undersigned attorney is available at the telephone number noted below.

The Director is hereby authorized to charge any fees, or credit any overpayment, associated with this communication, including any extension fees, to CBLH Deposit Account No. 22-0185.

Respectfully submitted,

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AMENDEMENT TO THE CLAIMS

10 (Amended) A system for controlling the melting of a glass batch in a glass melting furnace and comprising:

a plurality of sensors for detecting operating conditions in a furnace;

means for creating, and analyzing images taken inside a furnace in accordance with a predetermined mathematical model;

a predictive network which, depending on the state of the furnace and information regarding changes in production over time, defines various set point values assigned to furnace actuators;

means for storing operator set points corresponding to manual operation of furnace actuators under preselected conditions;

fuzzy logic controller means running a fuzzy logic control algorithm and connected at respective inputs to the sensors, image means, predictive network, and operator set points storing means, the controller means generating output signals for the actuators [and control devices] that will control melting in the furnace.

14. (Amended) [The system set forth in claim 11]The system set forth in claim 10 wherein the predictive network further comprises means for learning operating laws of the furnace, wherein the learning means is operated in accordance with a computer model of the numerical model type, making it possible to define the laws of furnace operation, selectively from a learning phase of the predictive network from actual furnace operation, or by simulation of furnace operation using a mathematical model.